LITTLE BLUE BOOK NO. 688
Edited by E. Haldeman-Julius

Teeth and Mouth Hygiene

Louis Reiss, D. D. S.
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Chapter 1.

TEETH AND GENERAL HEALTH

It is only in very recent years that the true relation of the teeth to the general health has been adequately realized, either by the dental or medical professions.

As late as 1910, Dr. W. Hunter, a famous English physician, in an address on "*The Role of Sepsis and Antisepsis in Medicine*," was the first to definitely stress the harm done by what he termed "septic dentistry." He had observed the serious results in many cases from the attempt to treat teeth as if they bore no relation to the body as a whole.

With the best of intentions, there was a tendency before that time to save the tooth, regardless of its diseased condition, if it could be patched up in such a way that it would look presentable and contribute its share to mastication. It was a case of cosmetics and utilitarianism. The pathology behind the diseased tooth was not taken into consideration.

While Dr. Hunter's criticism was at first bitterly resented by the dental profession, subsequent investigations disclosed in the main the soundness of his position. As a result dental procedure, since that time, with respect to the treatment of diseased and infected teeth, has been very largly revolutionized.

The up-to-date dentist no longer merely considers his patient's tooth. Instead, he considers the patient as an organic entity, fully knowing that one diseased tooth may cause trouble in

any organ, nerve or muscle of the body. Also, it may affect the mind, causing various sorts of mental aberrations, and in extreme cases has been known to cause death.

Of course, preventive dentistry, which is and has always been the great constructive goal of the profession, has not been essentially changed by the present knowledge of the constitutional character of dental sepsis. After all, the great field of dental and mouth hygiene lies in keeping the teeth sound and healthy from infancy, throughout life, and this is the premise which will be stressed in the present treatise.

It is infinitely more desirable to build a sound structure in the first place and keep it in a healthy condition, than it is, by neglect or ignorance, to build an imperfect one and allow it to run a quick course of deterioration and ruin. And as we shall show, a good, sound set of teeth can be built up in the individual, if we begin soon enough, and the teeth can be kept healthy and intact during a long lifetime.

Fortunately, by proper attention to diet, mouth hygiene and the precaution of periodical dental examinations, there is no reason why every individual, if correctly started out in infancy—or, more strictly, in the embryonic life—should not have sound, healthy teeth.

DENTAL "CARIES" OR TOOTH DECAY

Teeth as a factor in health and well-being, or in morbidity and disease, exert a profound influence in every individual's life. Often this influence, whether for good or ill, is concealed and unsuspected. At the high-tide of health and vigor, we do not realize how tremendously indebted we are to our teeth.

On the other hand, in ill health and disease,

we do not begin to suspect the role which the teeth play either as the principal or contributing cause of many of our maladies and miseries.

The most common of all the ills to which the human body is heir is decayed teeth. It is a disease to which all races and tribes are subject, and yet it is a disease preeminently of higher civilization.

While it is true, according to the data we have at hand, that no class of people in the past, whether savage, barbarian or semi-civilized, has escaped wholly from dental maladies, yet it is certain that, under existing conditions and with modern dietary habits, civilized people are particularly susceptible to diseased teeth.

Like many other diseases, decayed teeth and abnormal conditions of the mouth, play the greatest havoc with the poor.

There are many factors involved in the healthy upkeep of the teeth, and in their disintegration and destruction, which are not generally known to the layman.

As an instance, it is conceded by the dental profession that the prevalence of decayed teeth among females is decidedly more pronounced than among males, some authorities placing the ratio at three to one.

The periods immediately preceding motherhood and during nursing are particularly favorable to dental troubles, for reasons which will be set forth in a subsequent chapter.

Dental *caries*, or tooth decay, is but the beginning of a long series of maladies which may finally undermine the general health.

The accumulation of tartar deposits, and of particles of food between the teeth and in the crevices of the gums are the principal cause of tooth decay. Bacteria in colonies, called "pla-

ques," form on tartar-laden and unclean tooth surfaces, and especially in the interspaces.

The bacteria are nourished by food, especially the easily fermentable carbohydrates, of which the most prominent are sweets. As the colonies of bacteria are protected by a gelatine-like membrane from the neutralizing effect of the saliva, the sugar and other carbohydrates ferment underneath.

Lactic acid is thus produced which comes into direct contact with the tooth, dissolving the inorganic enamel. This is the beginning of the formation of a cavity.

It is true there is a great difference in the resisting powers of teeth. Hard and well-formed teeth resist decay, while teeth of poor quality readily fall prey to disease.

Tartar is a rough substance, dark brownish or greenish in appearance, and is usually the result of local causes, but general conditions may also be a factor.

The saliva contains a certain quantity of salts. These salts, mixed with food debris, cause the particles to adhere in deposits around the teeth. The quick formation of tartar is the product of organic decomposition. This, in turn, becomes a powerful irritant to the gum and induces inflammation.

A foul-smelling mouth and breath of objectionable odor are the usual accompaniments of tartar deposits. This may be followed by chronic spongy gums and perhaps pyorrhea—a discharge of pus from the gum pockets, often associated with complicated disturbances throughout the whole system.

It is perfectly evident that a filthy condition of the mouth which an accumulation of tartar produces, is a seat of active incubation for the

germs of many diseases. Some characteristic cases of this kind will be taken up under the appropriate heading.

ANTIQUITY OF DENTAL DISEASES

There are very conclusive records of dental infections, and of elaborate, systematic attempts made to relieve these maladies, dating far back into human history. Anthropology and archæology contribute, with history, their testimony to mankind's ancient dental disabilities.

Many Egyptian mummies, and even skulls of prehistoric periods, show very definite evidences of caries, or decayed teeth, and other diseases of the teeth. One of the oldest of these specimens, an Egyptian mummy of the period about 2800 B. C.—more than four thousand, seven hundred years ago—may be seen in the British Museum.

Herodotus, the Greek historian (born 484 B. C.), who visited the valley of the Nile to study the religion and sciences of the early Greeks, gives an interesting account of the customs and habits of these ancient people, who enjoyed a relatively high degree of civilization. He found in those early days that medicine and surgery were divided into distinct professions, and each of these branches had its trained specialists. There were specialists of the ears, eyes, teeth and internal organs. So we learn that dentistry had reached the dignity of a specialized profession more than two thousand, five hundred years ago.

Not only of the old world is there evidence of ancient dental pathology. There are in the National Museum in Washington collections of skulls of prehistoric inhabitants of North and South America, which betray the existence

of dental caries, and even more so of alveolar abscesses, caused by death of the tooth pulp from wearing down of the teeth.

"DEAD" TEETH AND THEIR RESULTS

The living, organic part of the tooth is the pulp, which is supplied with nerves and blood vessels. The function of this important tissue is to give sensation and supply nourishment to the tooth, which means *life*. Like any other tissue that is nourished by blood, a tooth has little chance of surviving if it is deprived of its chief source of blood supply.

That is why it is so necessary, as soon as a small cavity appears in the tooth, to check it by means of a filling. If the small cavity is not attended to at once, the tooth is doomed to a troublesome career. The decay gradually saps the vitality of the pulp, endangering the very life of the tooth.

Many persons, probably under the influence of an older and now obsolete school of dentistry, are too anxious to have the "nerve" (pulp) removed, thinking that by so doing the pain will disappear forever. But this is only the beginning of more serious trouble. The tooth so deprived remains an easy prey to various changes that occur in the system and is very susceptible to blood derangements, making it a target of attack for ulcers, or abscesses.

Generally speaking, a "dead" tooth is a hazard one can ill afford to carry around in one's mouth, and it may become a very real danger. When the nerve and blood supply to the tooth structure have been removed, there is bound to be a process of putrefaction going on. If the system is in perfect condition, it may be able to

eliminate the putrid secretions from this source without *apparent* ill effects.

On the other hand, if the vitality becomes low and the bodily resistance weakens, there is no telling what effect a "dead" tooth carried around in the mouth will have.

The pains are not by any means limited to the jaws and adjacent parts of the face, although these are common enough, such as neuralgia, which may attack the eye or ear in a most excruciating manner.

There are countless numbers of cases of bodily ailments, rheumatism, diseases of the blood, liver, kidneys, heart, eyes, swellings in the legs and finger joints, even nervous exhaustion and insanity, that are due to chronically infected teeth.

Dr. Henry A. Cotton, medical director of the New Jersey State Hospital, has proven with many cases under his care, that physical disorders, such as infected teeth and tonsils and infections of the stomach and intestines, *cause more insanity than heredity.*

One of the first things Dr. Cotton does when a so-called insane patient is brought to his institution is to examine and X-ray his teeth, and provide radical treatment when the result of the examination shows it to be necessary. Other physical disorders are, of course, searched for and treated when present.

Either mental aberrations, or physical ailments which result from infected teeth, are due to the accumulation of toxins (poisons) in the system, which lower the resistance of the organism, and assert themselves where the resistance is weakest. If one has a weakness in any part of the body, it may soon become the seat of serious trouble. If there is a predisposition to mental disturbances, these disorders may ensue.

FOCAL INFECTIONS

If an infection starts in one part of the body and is transported to another part, the process is termed a focal infection. The original site of the disease is called the focus, and the germs and toxic material (poisons) are absorbed by the blood and cause the secondary infection in the new location.

The most frequent dental focal infections (for there may be *foci* in other parts of the body, as well) are the diseased pulp of a decayed tooth, an infection at the end of a root, and severe cases of pyorrhea.

It is important to remember that pain is not necessarily present in a focal infection—although it may be strongly in evidence. Nor is good general health a certain sign of the absence of a focal infection.

Good health may mean that the vitality is so great and the resistance to disease toxins so strong that the poisons emanating from the infected tissue are for the time being successfully eliminated from the system.

This process, however, is a constant, abnormal strain on the organism, and in a crisis, or when the vitality or bodily resistance is lowered from whatever cause, a serious reaction may occur. This will assert itself, probably not in the focal seat, but in some other part of the body, selecting some particular organ that is not quite as strong as the others, or it may become constitutional in character, and strike at the whole organism.

When there is a doubt or some question of the probability of a dental focal infection, even in the case of teeth of thoroughly sound appearance, it is desirable to have an X-ray taken of the teeth. If there is a latent infection or blind

abscess, the X-ray will reveal the fact, and drastic action should be taken to rid the body of this liability to health, this menace to the welfare of the organism.

Besides specific organic disturbances that may result from focal infections, other troubles of a more general character sometimes occur—so-called constitutional defects. Among the symptoms of these are fever, rapid pulse and respiration, dry, hot skin, constipation, highly colored urine, later sweating, sometimes accompanied by delirium at night. Where the absorbed bacteria grow in the blood, the condition, which is a serious one, is known as *septicemia*, popularly called "blood-poisoning."

As the process of chronic pus absorption takes place rather slowly, there are usually no sudden and acute symptoms. This gives the victim a sense of false security, which permits ever-present dangers to be underestimated or ignored, with results that are sometimes ruinous to the general health.

TEETH AND FACIAL DEVELOPMENT

The teeth influence our health and lives in many ways, as we have already shown, and which will further be elaborated upon in the chapters that follow.

It is worthy of mention, however, that the teeth have a definite influence in the formation of the jaws and face, and in facial expression, determining whether the expression shall be pleasing and attractive, or ugly and repellent.

There is no mistaking the fact that sound, symmetrical and healthy teeth beautify the face. This is not only a fact of cosmetic interest, but it implies that we should make the most of our natural resources, physical and mental.

Besides the purely physical reflection of good dental economy, there are also mental influences that are worthy of mention.

The presence of a set of sound teeth in childhood, for instance, tends to the development of the jaw, which improves the contour and appearance of the face. If a child loses his deciduous (milk) teeth too soon, or if the first of the permanent teeth decay quickly, there is apt to be a shortening of the jawbone in the course of its growth, which will be anything but desirable for the appearance of the individual. Furthermore, a condition of this kind leaves its deleterious imprint in other ways.

The human teeth were meant to use (not for non-use or abuse), and use implies plenty of work on foods that have to be well chewed and masticated before they should be swallowed.

There is a grain of truth in the witticism "one can be what one chews to be." If adequate teeth are lacking, or if, for other reasons, a person—particularly a young, growing person, does not chew his food sufficiently, or is in the habit of eating soft foods which require little chewing, this fact may have a pronounced influence on the shape of his face, his expression, his health and mental development.

If a child is backward physically, he is almost invariably backward mentally. After all, the organism—body and mind—is a unit, and one part of the organism cannot be neglected or abused without detriment to the rest of it.

Chapter 2.

MOUTH HYGIENE

The late Dr. Osler, one of the great physicians of the present age, in an address delivered before the students of the Royal Dental Hospital of London, said:

"You have just one gospel to preach, and you have got to preach it early, and you have got to preach it late, in season and out of season. It is the gospel of the cleanliness of the mouth; cleanliness of the teeth; cleanliness of the throat. These three things must be your text through life.

"Oral hygiene—the hygiene of the mouth—there is not one single thing more important to the public in the whole range of hygiene; and it is with that which you, as practitioners, will have to deal."

The emphatic statement of this great teacher and physician to a class of dental students is repeated here because it clearly emphasizes the supreme importance of oral hygiene—mouth cleanliness.

Unfortunately, it is not widely recognized how close is the relationship between an unhealthy and unclean mouth and many serious general diseases of the body, both of the infectious and non-infectious types.

Of the former, children, in particular are highly susceptible, because of their common practice of carelessly putting into the mouth objects without much regard to their nature, or possible germ-carrying properties. As a result, germs are conveyed to the mouth, where, if the utmost cleanliness does not prevail, they find

a favorable field for incubation, and only too often visiting disease upon the child.

A knowledge of the principle of hygiene, which is acquired by children who are taught to keep their mouth clean and wholesome, makes them more careful not to put casual objects into the mouth.

RESULTS OF ORAL HYGIENE

By many it may seem trite to stress the importance of oral cleanliness, when mouth hygiene is now considered a routine matter in the daily lives of millions of people. But, strange as it may seem, there are more millions by far in this country who are strangers to the tooth brush than there are patrons of this agency of cleanliness.

A statistician some time ago estimated that less than twenty-five million people in America are habitual users of the tooth brush. Simple arithmetic tells us, therefore, that over eighty-five millions of Americans are still to be converted to the merits of elementary mouth hygiene.

Dr. Alfred C. Fones, a pioneer in oral hygiene, initiated a system of mouth hygiene in the public schools of Bridgeport, Conn., in 1914, from which was traced a marked decrease not only in dental diseases, but in the contagious diseases common to childhood.

Dental hygienists were placed in the various schools, and their number was increased until, in 1919, twenty-six were appointed. These women, who received intensive training, both scientific and practical, in a special school for dental hygienists, supervised the care of the mouths of nearly twenty thousand children.

All possible emphasis was laid on cleanliness, and the *prevention* of dental decay. After de-

cay has once set in, all work is of necessity palliative, and has to be more or less continuous, with results that cannot be foreseen.

Dr. Fones began the first year with the first and second grades. A careful system of four distinct parts was arranged. First, the hygienist would clean the teeth of every child in the school.

Secondly, tooth brush drills were practiced to teach a method of brushing the teeth at home.

Thirdly, class-room talks relating to food and cleanliness were given, supplemented by stereopticon pictures.

Fourthly, the parents' interest and co-operation were obtained through special educational literature.

As a result of this systematic work, in 1921, the reduction in dental decay in thirty schools where the children were under treatment averaged 69.3 per cent. One of the remarkable results was that out of 1,161 children in the fifth grade, only 65 had cavities in their permanent teeth.

Furthermore, the reduction in decay was accompanied by a reduction in the percentage of retarded pupils, from an average of forty to twenty.

Communicable diseases as we have already observed, are highly prevalent among children with unhygienic mouths. The greatest harm is often done before the child starts to school because of the neglect on the part of the parents in caring for their children's mouths.

After the mouth hygiene system had been in effect in Bridgeport for four years, there was a marked decline in the death rate of three common diseases among children. The following figures give the death rate per 100,000 popu-

lation in 1914, before introducing the system, and four years later:

	1914	1918
Diphtheria	36.6	18.7
Measles	20.	4.1
Scarlet fever	14.1	0.5

This represents a reduction in these three diseases from 24.6 to 7.8 per 100,000 population.

Of course, it is impossible to prove that the entire results were due to the mouth hygiene campaign. Perhaps other factors entered into the situation. But there is no doubt in the minds of those who witnessed and studied the remarkable accomplishments in Bridgeport, that by far the greatest single factor in reducing diseases among children was oral hygiene —a well-taught lesson in cleanliness.

HOW TO CLEAN THE TEETH

Every one should be on intimate terms with a tooth brush and a good dentifrice (powder or paste) recommended by a dentist. It is desirable that the teeth be carefully brushed after each meal. While the brush is looked upon by some members of the dental profession as a bacteria carrier, nevertheless, with proper care of the brush by the user, and until some more hygienic agency is devised, we must continue our allegiance to the tooth brush.

Some authorities advocate the rotary or circular movement of the brush upon the teeth and gums, while others prefer the rolling of the brush from the neck of the gum toward the biting edges of the teeth.

The former claim that when the gums are not in a healthy state, injury from the bristles of the brush might result and cause irritations opening up avenues of infection. The latter

maintain that no harm can result from such procedure.

A middle course may be suggested. First, ascertain whether the gums are firm and in a perfectly healthy state. If so, carefully brush the teeth with a suitable powder or paste, in front and in the back. Care must be taken that the brush reaches surfaces of the grooves of the posterior teeth, where particles of food are apt to lodge.

The gums should be brushed when cleaning the teeth, but with the utmost care and without using pressure on the brush.

Of the three grades in which tooth brushes are usually made—"soft", "medium" and "hard", the "medium" brush is to be recommended for general use. The soft brush is usually too soft to be effective in removing particles of food from crevices and spaces between the teeth; while the "hard" brush, because of the stiff, wiry bristles, may injure the delicate gum tissue.

Some authorities contend that when the gums are irritated constantly in this way and made to bleed, the abrasions invite infection; and is often the cause of acute stomatitis, and is also conducive to pyorrhea. On the other hand, Dr. Paul R. Stillman, in a recent article on the care of the gums, said one of the chief problems in managing cases of gum tissue with a low tone is to arouse the regenerative forces of nature and maintain a constantly high tone in the gum tissue. To realize this end, stimulation and massaging of the gums by careful brushing is advocated, and an occasional bleeding is not considered injurious.

It is evident, from the foregoing statements, that until there is more unanimity of opinion,

a moderate course and the avoidance of extremes are advisable.

The tooth brush alone should not be depended upon, and no cleansing outfit is complete without a spool of silk dental floss. Food debris will stick between the teeth, and the danger resulting from such germ incubators as tend to propagate dental decay is best removed with silk floss drawn between the teeth. Care must be taken that the gums are not irritated by this procedure.

A little lime-water is excellent to rinse out the mouth after cleaning. While the lime-water is in the mouth, force it back and forth between the teeth with the tongue and cheeks. Continue this until the water foams, which indicates that it has been in the mouth long enough to have had a beneficial action on the teeth.

Lime-water has a very pronounced influence in preventing the decay of the teeth, and when used in conjunction with a general regimen of mouth hygiene, it is a valuable supplementary agent.

Milk of magnesia may be used as a mouth-wash for children, particularly in case of over acidity, such as when the teeth are sensitive and set on edge when eating grape-fruit, grapes, lemons, etc.

When tooth picks are used—although it would be better to use silk floss instead at all times—great care should be taken to avoid injuring the gums. Wooden tooth picks are unsafe for this purpose, as they are too thick and clumsy to enter the dental interspaces. They have been known to break and leave slivers in the gums, causing inflammation, suppuration and sometimes sepsis.

The only tooth picks to be recommended are thin, sterilized quills. These can be used with-

out injury to the tissue, and, when scraped thin, will easily pass between the teeth. At the same time they are sufficiently rigid to remove the ordinary fibrous food debris that becomes lodged between the teeth.

The tooth brush should be kept in a sterile condition, so as to avoid danger from infection. This can readily be accomplished. The brush should be carefully washed with clean water each time after using, and preferably immersed in ethyl alcohol. A glass holder, fitted with a screw top, makes an ideal container for the brush.

THE TONGUE

As it is impossible to keep the mouth in an hygienic condition if the tongue is unsanitary, this organ often requires special attention. The upper surface of the tongue is equipped with numerous tiny *papillae* and minute grooves or depressions surrounding them.

This uneven surface offers an attractive breeding ground for objectionable micro-organisms. To have an hygienic mouth, the dorsum —upper surface—of the tongue should, therefore, be cleaned every morning. A simple instrument, known as a tongue-scraper, made of ivory, celluloid, or bone, may be obtained for this purpose. It is a bow or loop-shaped device, with a handle about six inches long. A home devised substitute in the form of a silver butter-knife, may be set aside and used for this purpose.

In using this appliance, it should be placed well back in the mouth, to the root of the tongue, and then drawn forward upon the surface to the tip of the organ. This should be repeated a few times.

It is said that the Japanese include a tongue-scraper with every tooth brush sold. In this respect, we Occidentals might well take pattern after the scrupulously clean Japanese In the absence of a tongue-scraper, the tooth brush may be used for the purpose—drawing it over the surface of the tongue—but it is not so comfortable or well adapted.

MOUTH WASHES

Mouth washes, it should be understood, are not by any means a substitute for thorough and regular brushing of the teeth. Real mouth cleanliness can be obtained only by mechanical means. Washing the mouth out with fluids will not remove food deposits left on the teeth, particularly those lodged in crevices.

However, washes have their place, as an auxiliary measure, in the regimen of mouth hygiene. They are especially useful in helping temporarily to overcome an offensive breath —in connection with other necessary treatment; in removing a "bad taste"; as a cooling agency, and to allay an inflammatory condition of the mouth as a result of disease or other cause.

There are mouth washes based upon both alkaline and mildly acid principles. As most of the destructive germs of the mouth flourish in an acid reaction, the alkaline solution neutralizes the acidity, thus making the condition of the mouth less favorable for the propagation of germs.

Of the alkaline group, the most readily available and one of the most efficacious, is salt and water—a mixture of a teaspoonful of ordinary table salt to a glass of water. If more salt is used, however, it will do no harm. Soda bicar-

bonate, or common baking soda, in the proportion of a teaspoonful to a glass of water, is also excellent.

Milk of magnesia, already referred to, is considered by some authorities to be very good. When worked about the mouth and between the teeth, it not only neutralizes the acidity, but protects the teeth by leaving a coat of magnesia over their surface.

Of the mildly acid mouth washes, hydrogen peroxid, mixed one part to two of water, is germicidal. The regular use of this preparation, however, has a tendency to produce an unpleasant irritation and "set the teeth on edge." In fact, any acid element has this effect, more or less.

Listerine, properly diluted, is a pleasant, mildly acid mouth wash with antiseptic properties.

Dakin's solution is another powerful anticeptic mouth-wash, the product of Dr. H. D. Dakin. It was widely and effectively used for treating wounds in the World War, having been sponsored by Dr. Alexis Carrel, the famous surgeon.

Dr. W. H. Dixler, in a paper read before the Pittsburgh Adontological Society, described its action most interestingly as follows:

"The action of Dakin's solution is an intensely germicidal one, having a store of chemically combined chlorine in a form which is non-irritating and non-toxic. When brought into contact wth proteins and blood serum microorganisms and pus, it readily parts with its chlorine to the basic substance, immediately exerting its antiseptic and germicidal action.

"We found that it performs this chemical action without irritation, and that it does not coagulate albumen, nor does it interfere with

the digestive action of trypsin of protein, but it does actively disintegrate protein, and influence a flow of lymph, thereby cleansing the wounds, which is one of the most important features in wound sterilization. We are inclined to believe that necrosed tissue is dissolved and liquified, so that it may be carried away by drainage or absorption, and in this way the germs on the clean surface of the living tissue readily are exposed to its germicidal action."

Dakin's solution is also efficacious in combating pus formation in pyorrhea. In fact, it is valuable in overcoming pus formation under any conditions, and on this account proved itself so useful in treating the suppurating wounds of soldiers during the World War. The remarkable strength, combined with its non-toxicity, is attested, when we realize that a one in one-thousandth solution of this germicide is more effective than a five per cent solution of carbolic acid.

As a mouth wash, it is used in one-half to one per cent strength, morning and night, or when needed. The mouth should be rinsed thoroughly, retaining the solution for a minute or two in order to have the antiseptic liquid act upon the germs.

BLEEDING GUMS. Persons troubled with bleeding or sore gums should consult a dentist, as this may prove to be a symptom of approaching pyorrhea, or other deep-seated disorder. However, if home treatment is imperative, Dakin's solution may be recommended for temporary use; also sodium perborate (Merk's) —one teaspoonful to half a glass of water, used as a mouth wash every two hours.

Stomatitis, or inflammation of the mouth, which generally takes on the form of blisters

or ulcers, is a very distressing complaint. Attention should be given to diet, as well as to the most thorough-going hygiene of the mouth, and a physician might well be consulted to see if there is any general symptomatic trouble, or if the inflammation is a symptom of any other more serious disease.

Chapter 3.

TEETH IN INFANCY AND CHILDHOOD

While the baby comes into the world apparently toothless, the dental situation of the newborn is not as free from complications as it seems.

At the time of birth the first teeth are *practically completely formed,* lying beneath the gums. And under the first teeth, the permanent teeth are already beginning the process of formation.

It should be evident, therefore, that the soundness and strength of the baby's teeth depend upon (1) the nutrition which the mother has taken while carrying the child, and (2) the nutrition which the baby receives from the time of birth until the teeth make their appearance.

And, of course, the continued health of the teeth after they have all come through the gums, throughout childhood and later, depends upon the individual receiving foods containing the proper nutritive and vital elements in subsequent years as well.

This is in addition to the regimen of oral hygiene already outlined. Cleanliness preserves the teeth against the attacks of foreign foes (germs), and prevents their breeding; but a properly balanced diet, according to the age of the individual, builds good, sound teeth in the first place, and makes them more resistant to disease and infections.

So we see that by combining oral hygiene with the right diet, we are taking advantage of every means to establish and maintain sound,

healthy teeth, and this goes a long way toward building up health and strength in body and mind.

MOTHER BUILDS HER BABY'S TEETH

As we have intimated the quality of our teeth is determined largely before we are born. This depends upon the process of calcification which is the deciduous, or temporary, teeth, begins some nineteen weeks before birth; and in the permanent teeth (the first permanent molar is the first to calcify) ten weeks before birth.

The calcification of the crowns, which is the part of the tooth exposed to decay, is complete in the first set six months after birth, and in the permanent set between the first and ninth years, excepting the third molars ("wisdom" teeth), the crowns of which are not finished calcifying until about the 12th year.

From this it will be seen that the quality of the first set of teeth is largely dependent upon the diet of the mother during pregnancy and the nursing period, as the food that the mother eats supplies, through her blood circulation, nutrition for the growth and development of the child.

Even thirty weeks before it is born, the baby commences to develop its teeth. At about the sixth week after conception, a tissue forms on what afterwards develops into the jaws of the embryo. This is termed the "dental band."

From this *dental band*, are formed the cells and sacs and tissues which in due time become bone and pulp and enamel, and all the other elements of the tooth structure.

During the busy months of the inter-uterine period, as we have noted, the teeth are being formed, and for several months after birth they

are further developing, preparatory to breaking through the gums. The second teeth, in fact, continue developing within the jaws for several years before they finally make their appearance.

Organic mineral salts and vitamines are of the utmost importance for the development of bone and teeth, and these can only be supplied the unborn child, and the nursing child, if the mother's diet is abundantly supplied with these elements.

Inasmuch as the calcification of the permanent teeth continues, as we have mentioned for a number of years during the child's early life, it is therefore necessary that the young individual be supplied with a well-balanced diet during all the growing ánd developing years.

Unfortunately, our modern prepared foods which are so generally used, are extremely deficient in vitamines and mineral salts. Consequently, not only are the teeth frequently poor in quality, so that they become ready prey to dental *caries*, but the whole organism suffers from this deprivation.

Nor do strong, hard teeth necessarily remain so. The lime salts which are used in the formation of the teeth may become absorbed by the system if there is a deficiency of lime salts in the body. This absorption (robbing the teeth of a vital element) takes place when the diet is lacking in lime salts.

It is worthy of notice that these mineral salts are contained in abundance in those parts of our food which are usually thrown away—such as fruit skins, the hulks of grains, potato peelings, etc. In the endles assortment of prepared and denatured foods that are bought so lavishly at the corner grocery, much or all of the min-

eral salts have been removed in the process of refining and preserving.

Not only is the question of food important from the standpoint of the child's well-being, but it is also very important to the pregnant woman. Decayed and acutely abscessed teeth are common occurrences during pregnancy. This is due to the demands upon the woman's body in the development of the new being within her.

A complete, new organism is being formed, and the entire material must be supplied from the mother's bodily chemistry. If her diet does not include sufficient mineral salts, then the needs of the evolving baby are at least partly supplied by drawing upon the salts from the mother's bones and teeth, thus predisposing to dental *caries*. This important question will be further discussed in a subsequent chapter.

TEETH IN INFANCY

As has been stated, the "teething" problem of infancy does not begin during the middle of the first year, or later, when the teeth usually begin to erupt. It really begins with the inception of pregnancy, and when this is understood, the teething problems of infancy will be more easily and satisfactorily dealt with.

About the end of the sixth month, in the usual course of events, the first of the deciduous teeth, make their appearance, generally the lower front ones.

These are followed at more or less regular intervals by the upper "incisors," then the "back teeth," and finally the "cuspids," popularly called the "stomach" and "eye" teeth, when the complete first set of twenty teeth have appeared.

The ages at which the first teeth usually erupt are as follows:

Two lower front teeth (central incisors)—5 to 7 months.

Two upper front teeth (central incisors)—6 to 8 months.

Two more lower front teeth (lateral incisors) —7 to 9 months.

Two more upper front teeth (lateral incisors) —8 to 10 months.

Four back (molar) teeth, one on each side of the jaw—10 to 14 months.

Four more molar teeth, back of the others,— about 2 years.

Four cuspids ("stomach" and "eye" teeth)— 2 to 2½ years.

The appearance of each tooth is an important step in the development of the child. When all the first teeth have come through, coarser foods, that require a great deal of chewing, should be given to the child, and it should be taught to masticate the food thoroughly.

Thorough chewing serves a two-fold purpose; first it insures proper preparation of the food for its entry into the stomach; secondly, it is necessary in order to properly develop the bones and tissues of the jaw and head, thereby contributing to the facial appearance.

Proper attention to chewing, together with consideration for a balanced diet, insuring sufficient organic minerals and phosphorus to supply the teeth and bones with the necessary elements of their construction, and mouth cleanliness, are the basic necessities for healthy teeth, a healthy body and abundant vitality.

This regimen will contribute materially to the upkeep of the first teeth, until they have served their purpose, which is much more important than is generally supposed.

The preservation of the first teeth until they have completed their useful function is of very great importance.

The premature loss of the "temporary" teeth may be followed by a train of evils—imperfect chewing, poor digestion, irregularities of the permanent set of teeth, distorted features, and frequently severe suffering from toothache, which, if long continued, may induce chronic nervous affections. Children afflicted in this manner make up a great majority of the "backward" pupils in the public and special schools.

Parents should make it a practice to take the young children to a dentist at regular intervals —at least every six months, and even every three or four months in early childhood would be better, because of the desirability of catching any decaying spots at the very beginning. This will go far toward preventing decay, and will lead to the detection of decay before much harm has been done. And not of least important. it will restrict the dentist's treatments to easy and painless operations, so that the child will grow up with no fear of dentistry.

DIETARY HINTS FOR INFANCY

Whenever possible, the nursing infant should be breast-fed until the ninth month. There is no substitute which equals the mother s milk when it is of good quality and sufficient quantity to feed the infant.

Furthermore, the development of the baby's jaws, teeth and skull, and the facial and throat muscles, are promoted by breast feeding. So that not only is the natural food far more desirable, but the exercise and stimulation to growth, which are involved with the taking of the natural food, make a definite contribution

to the infant's welfare, that is lacking in connection with artificial food and bottle nursing.

The nursing infant should have plenty of cool, boiled water between feedings.

If artificial feeding is deemed necessary, it is always better to consult a baby specialist. The advantages of this have been proven over and over again. Many useful hints, however, will be found in Dr. L. Emmett Holt's admirable book, "*The Care and Feeding of Infants.*"

When the baby is three months old, it may be give once a day a teaspoonful of orange juice, strained and diluted with the same amount of cool, boiled water. This amount may be increased gradually until at the age of one year, the child is taking the juice of one-half orange.

Orange juice is wonderfully rich in vitamines and mineral elements, and there is probably no more valuable article of diet for persons of any age. If oranges are unavailable, a little ripe tomato juice, strained and diluted may be used. No sugar should be added.

Solid foods should be introduced very gradually, so as not to cause any disturbance of the digestive system, or interfere with the development and growth of the child.

At the sixth month, it is well to add to the diet a well cooked wheat or oat cereal, preferably with the mid-morning breast-feeding. Begin with a very small amount—a teaspoonful at the start is enough—and gradually increase the allowance.

At from eight to nine months, a vegetable and some cow's milk may be added to supplement the regular feeding. This is best given in the early afternoon. The vegetables to be preferred are spinach, swiss chard, asparagus, cauliflower, onions, green string beans, squash,

celery, carrots, peas, white turnips, or potatoes cooked in a little water, and put through a sieve and served with a little butter or cream. No sugar should be used. Very small amounts should be fed the child at first.

At about the same period, stewed and strained fruits may form a part of the diet. Raisins, apples, pears, prunes, dates, and figs are all good and more or less obtainable at any time.

When the baby is about eleven or twelve months old, it may be given zweibach or hard buttered toast with one meal a day. This encourages mastication.

The thorough mastication of food is indeed of fundamental importance. It is not only necessary as a preliminary to good digestion, but also for the proper development of the teeth, gums and jaws, and the facial muscles. The formation of this habit has a pronounced influence on facial appearance and on health.

To encourage mastication, as soon as the child is old enough to eat solids, some hard foods that have to be well chewed should become a part of the regular diet, as well as the soft foods. Crusts or pieces of dry bread, bread-sticks, zweibach, with butter, will serve this purpose. Hard breakfast foods should gradually be introduced from the time the child is two years old.

At all times encourage the child to eat slowly and chew its food thoroughly. This is very important. It is a valuable habit that can be cultivated, and once formed, it becomes "second nature."

While on the subject of the infant's diet, it will be well to emphasize that choice and range of foods for the older, growing child should also receive adequate attention. This

applies to all the developing years of childhood and adolescence.

There should always, if possible, be two or three vegetables in the daily diet. They may be selected from any of the following: Spinach, lettuce, celery, beet tops, or any other greens, tomatoes, carrots, white turnips, dried beans, string beans, peas, cauliflower, asparagus, green peas, squash.

Fresh fruits in season, and dried fruits at other times, should be called upon—oranges, apples, pears, peaches, raisins, prunes, apricots, dates, figs, cantelope, berries, etc.

Milk is a most desirable supplementary food for the growing child, because it is rich in the mineral elements and the vitamines. The presence in appreciable quantities of Vitamine C, however, depends upon the cow receiving plenty of green food. Furthermore, in sterilized, pasteurized, or cooked milk, the vitamines are to a large extent destroyed. The liberal use of fresh vegetables, and orange juice, which are rich in vitamines, is therefore advocated when the milk has been heated.

There are certain harmful habits, quite common in the long run, which mothers should guard against in the raising of children. Thumb or finger sucking is a bad habit, because it produces disfigurement of the jaws and face, and also causes tooth irregularity.

The use of a so-called pacifier is to be condemned, as it leads to flattening of the mouth, tooth irregularity, and introduces air into the baby's stomach.

Mouth-breathing, a sign of obstruction in the breathing passages—often adenoids, is a distressing habit, and should receive special surgical attention. Among the ill results of this unnatural method of breathing are irregularity

of the teeth, disfigurement of the face, air starvation, and increased susceptibility to infectious diseases. Everything should be done to enable the child to breathe through its nose.

THE PERMANENT TEETH

The first of the permanent teeth to make their appearance are the "six year" molars. Not only are these the first of the permanent teeth, but the largest. They differ from the teeth that have thus far appeared in that they are not replaced by others. As they have no predecessor, they are often mistaken for deciduous ("milk") teeth and are neglected by those who consider the deciduous teeth of little importance.

These teeth play an extremely important part in the architecture of the mouth. They sustain the stress of chewing during the period in which the temporary teeth are being replaced by permanent teeth, and they also largely determine the position of the permanent teeth which follow. Consequently, the very shape of the jaw and the contour of the face are in part dependent upon the proper development and preservation of the "six year" molars. This name has been applied to them because they usually make their appearance about the sixth year. There is one in each side of both jaws. It is the sixth tooth back, from the front center, and should receive scrupulous care.

There are thirty-two teeth in the complete permanent set; sixteen in the lower and sixteen in the upper jaw.

They take their places in the dental arches, roughly speaking, between the ages of 6 and 18 years. The last to appear are the third molars ("wisdom teeth"), which may come

considerably later than this limit. For all practical purposes, however, the years during which the temporary teeth are shed and the permanent teeth erupted, may be put between the age of 6 and 18.

The teeth are the advance agents of the digestive system. They are the grinding mills and through the process of chewing they help to reduce the food (supplemented by the salivary fluids) to a form suitable for the digestive action of the stomach. The principal divisions of the functions of chewing are to cut the food into pieces and to grind and mix it with the secretions of the mouth.

There are several distinct types of teeth, each class designed by nature for a specific kind of service. In a full set there are twelve chisel teeth, 8 sharp tools with two points each, and 12 solid molars with large surfaces for grinding purposes.

The "chisels" are the *incisors*, and the *canine* or *cuspid* teeth. The double pointed teeth are the *bicuspids;* and the grinders are the molars in the back of the mouth. We cut our food with the *incisors*, *canines* and *bicuspids*. The tongue turns the food around in the mouth, and as a part of the process the molars grind the food into fine bits.

The following table gives an approximate idea of the time and the order in which the permanent teeth erupt, the figures, of course, being subject to slight variations in different individuals:

Four first molars, one on each side of each jaw—5 to 7 years.

Two lower front (central incisors)—5 to 7 years.

Two upper front teeth (central incisors)—6 to 8 years.

Two more upper front teeth and two more lower front teeth (lateral incisors)—6 to 8 years.

Two "eye" and two "stomach" teeth (cuspids)—9 to 12 years.

Eight bicuspids, four upper and four lower—10 to 12 years.

Two upper and two lower second molars—12 to 14 years.

Two upper and two lower third molars—17 to 25 years.

It is not uncommon for the third molars ("wisdom teeth") not to appear at all, in which case they are usually more or less developed, but remain in their crypts in the jaws for lack of space in the dental arch to accommodate them, or are malposed (turned out of their normal position), so their eruption is difficult or impossible.

About the time of this writing, Dr. Reiss had occasion to remove two impacted, unerupted, incompletely developed third molars from a man about sixty years of age. There was no clinical evidence of the presence of these teeth in the jaws, and they were only revealed by an X-ray picture. After their removal, the patient reported general improvement in health, as well as the passing of local agitation in his jaws which had hitherto greatly inconvenienced him.

INFANT MORTALITY FROM TOOTH TROUBLES

Dr. Harvey W. Wiley, the pure food expert, is responsible for the following astounding statement, which should cause every parent to pause and consider the dental question with respect to the child: "One thousand children die daily in this country; their deaths due

more to defective teeth than to any other trouble."

The high rate of mortality during the first year of life is too well known to need emphasing. However, the notable reduction in this death rate in some of the more progressive communities, indicates that very great strides can be made in saving the lives of infants during the first year. And it is not unreasonable to suppose the increased knowledge of mouth hygiene among educated people is an important factor in bringing about this desirable result.

The influence of clean teeth and clean mouths on older children, in preventing contagious diseases common to childhood, such as scarlet fever, measles, and diphtheria, has already been noted.

John Sayre Marshall, M.D., a well known dental authority, in "*Mouth Hygiene and Mouth Sepsis*," states that nearly all forms of stomatitis that affect infants and small children may be traced to an unclean condition of the mouth.

NORMAL SIGNS OF TEETHING

The usual signs of teething in healthy children are an increased flow of saliva; a tendency to put the fingers or some hard article in the mouth and bite on; swollen and congested gums; fretfulness and disturbed sleep; loss of usual appetite; sometimes slight diarrhea; and often a slight fever.

These symptoms, however, usually last only three or four days, while the teeth are coming through the gums.

Most of the digestive disturbances of babyhood, generally attributed to teething, are due

to improper feeding, and to chilling of the body.

The right kind of food and plenty of cool boiled water are the best aids to teething. A hard dry crust of bread may be given, or a freshly cooked chicken leg, without any meat on it, to bite on.

If it should be deemed necessary to have the gums lanced to relieve difficult teething, extreme care should be taken to keep the wound clean, so as to avoid infection. The lancing, of course, should be done by a physician or dentist.

The first few teeth that have erupted may be kept clean by the use of a piece of clean gauze, or cotton wrapped around the mother's or nurse's finger and dipped in a normal salt solution (½ level teaspoonful of salt to a glass of cool boiled water). The cleaning should include, besides the teeth, the gums, roof of the mouth, tongue, and inside of lips and cheek.

During the nursing period, the mother's breast should be cleansed with cool boiled water.

Chapter 4.

PYORRHEA AND OTHER DENTAL DISEASES

Pyorrhea, or Riggs disease—more technically known as *pericementoclasia*—is a very pernicious malady, about the pathology of which there is still a great deal to be learned. Enough is already known, however, of the characteristics of pyorrhea to prevent it in the average person, if proper precautions are observed; and to treat it effectively if the patient will heartily cooperate with the dentist, should there be an indication of pyorrhea presenting itself.

This disease is a chronic inflammation located in the membrane covering the roots of the teeth, and in the alveolar process or sockets of the teeth, which produces a gradual and painful dissolution of these structures. It is accompanied by a flow of pus from the alveolus, or socket, resulting, unless the progress of the disease is checked, in the ultimate loss of the teeth.

It is believed to be sometimes due to constitutional causes, such as rheumatism, diabetes, Bright's disease, gout, mercureal poisoning, anemia, and blood disorders.

A contributing cause is uncleanliness of the mouth, which permits deposits of tartar to accumulate where the teeth join the gums. As a result the gums become irritated and infected by disease—producing germs; the tissues are broken down and pus forms.

A predisposing factor in pyorrhea is believed to be irregular teeth, or malocclusion or improper closing of the teeth. This tends to

a mild form of rotation in the process of mastication, and the continued rocking of the teeth contribute to their loosening, which permits the invasion of the gum attachments by destructive micro-organisms.

There is no doubt that hereditary factors are paramount in determining the *character* of tissue and its susceptibility to, or tendency to resist, certain diseases. This is especially true of the membranes and tissue of the gums and mouth. However, there is equally positive evidence, in the opinion of prominent authorities, that local irritation is a specific cause of pyorrhea.

In this connection, Dr. John Deans Patterson sums up the etiology of the condition as follows: "*Any irritant, of whatever nature, which impairs the integrity and continuity of the gingival gum margin, may cause pyorrhea and without this impairment the condition will not be established.*"

Pyorrhea is not restricted to the gums of human beings, but affects as well the teeth of certain domestic animals, notably dogs and cats which share our human habitations.

Dr. Theobold Smith, in his dietetic experiments, while endeavoring to prove that scurvy could be produced by a faulty diet, was the first to produce pyorrhea artificially. He discovered that guinea-pigs fed on a diet of oats, would in three weeks show all the symptoms of scurvy. The dental symptoms were pronounced; the teeth loosened, and the gums became red and swollen, quite as in the case of the pyorrhea patient. Other medical experimenters have also shown the relationship of faulty diet and pyorrhea in animals. It is worthy of note that very few of the animals which received the same diet, but with the

addition of orange juice—which is extremely rich in vitamines—displayed the symptoms of scurvy and pyorrhea.

The early symptoms manifest themselves in a tendency of the gums to bleed upon slight provocation, usually while brushing the teeth, or while removing impacted particles of food from between them with a tooth pick.

When the attachments of the soft tissues of the gums to the teeth are destroyed, the teeth become loose and when the disease reaches this stage, there is little that can be done beyond removing them.

TREAT IT EARLY

At the first suspicion of pyorrhea, one should at once put his case in the hands of a dentist, otherwise the disease is apt to become rapidly progressive, and make treatment difficult or ineffective.

At the outset in a case of this kind, the dentist's treatment lies in thoroughly removing all irritating substances of whatever nature, and polishing the exposed teeth surfaces. The patient, on his part, should give more care and attention than ever to the hygiene of his teeth and mouth, cleaning them several times daily.

It is of paramount importance to keep the teeth and gums clean, and free from all irritating substances.

As there is a definite relation between pyorrhea and the general health, in some cases more noticeable than others, the patient should make every effort to put and keep himself in first-class physical condition. Every endeavor devoted to this end, will be amply repaid, because it will afford the best possible assistance

to the specific treatment that the dentist is giving.

There is no dental disease, in fact, in the treatment of which it is so important that the dentist receive the hearty co-operation and support of the patient.

More recent research indicates that malnutrition is a predisposing factor in pyorrhea. Faulty diet, especially in preparing foods so that an insufficient content of mineral salts and vitamines is obtained, seems to play an important role in the genesis of this disease. The experiments with animals, already referred to, lend confirmation to this theory.

Faulty elimination, and toxic absorption from food decomposition in the intestines—a result of chronic constipation—are also believed to be conducive to pyorrhea.

No medicine has ever been suggested which will cure pyorrhea. Medical treatment, if taken, can only be for some other specific disease, or for the general health. There is no medical specific for pyorrhea alveolaris.

RAVAGES OF PYORRHEA

After pyorrhea has definitely manifested itself, the gums recede and shrink, and the tissues surrounding the roots of the teeth deteriorate. Consequently, the attachments of the teeth to the socket in the jaw are loosened.

When the gradual destruction of tissue has reached this point, and the membranes covering the roots of the teeth are gone, there is no chance of ever replacing the tissue destroyed.

As there is always a pus secretion from pyorrhea, this adds to the evil results of the disease, because in masticating food the pus is squeezed from the gums and mixes with the food. Thus, there is a constant supply of poison

being swallowed by the pyorrhea patient. This is absorbed into the circulation—or at least carried into the digestive system, ready to assert itself malevolently in the event of low bodily resistance.

Dr. Hunter, the famous English authority already quoted, maintains that pus from the teeth, when swallowed with the food, is a cause of ulcers and other diseases of the stomach and intestines.

Pyorrhea may also cause disturbances in the local regions of the mouth, head and neck. The glands of these parts are particularly susceptible to inflammation. Infections of the nose and throat, diseases of the internal ear, suppuration of the tonsils, and other disorders, are also among the possibilities.

Dr. William H. Porter, Professor Emeritus of Pathology and Clinical Medicine of the New York Post-Graduate Medical School and Hospital, has summed up the treatment of pyorrhea in these words: "Keep the pus flowing, keep the surfaces clean, so that Nature will be enabled, by the germ-resisting action of the white corpuscles, to throw up a barrier, behind which the germs cannot thrive."

Certain rules with regard to eating, as well as conscientious oral hygiene, will aid in the prevention of pyorrhea. Soft, starchy foods, such as cakes and sweets, and gelatinous concoctions, should not be eaten between meals, nor late at night. When they are eaten at meal-times, they should be followed by foods which act as a cleansor, such as foods of a fibrous nature, and uncooked fruits, the juices of which have a beneficial influence on the teeth and mouth.

When one has a suspicion that the teeth are showing symptoms of pyorrhea, no time should

be lost in consulting a dentist. If anything can be done at all, it must be done at the start. After the disease has definitely established itself, the conditions are infinitely more difficult to treat.

Dr. Kurt H. Thoma, of the Harvard University Dental School, mentions the incident of a prominent dentist in the Western part of the country who, when giving a clinic at a dental convention to show the method which made his treatment of pyorrhea so successful, was reproached with the statement that his cases did not present pyorrhea at all. He replied that this criticism was a proof that most dentists either did not recognize the early stages of pyorrhea or else paid no attention to it until the disease was virtually incurable.

It cannot be too strongly emphasized that pyorrhea must be attacked in its incipient stages, if a cure is to be effected. When the gums begin to bleed and show signs of inflammation, then is the time to seek the best professional treatment.

ABSCESSES

There are different types of alveolar abscesses —of which the acute kind, with swelling and pain is best known to the layman.

The most intense pain accompanies the acute alveolar abscess. For this reason, treatment of some kind is usually given. The abscess begins as soon as the infection from the diseased or dead tooth penetrates through the opening at the end of the root.

With the inflammation of the tooth membranes, pus forms and gradually the surrounding bone is destroyed. In a few days the pus burrows a hole toward the surface, accumu-

lating under the gum, and finally obtains an outlet, usually in the mouth, forming a sinus, but sometimes on the outside of the face.

As the early inflammation forces the tooth outward in its socket, whenever the jaws close, the infected tooth is first to come in contact with its opposite tooth, with painful results. Later, the accumulated pus causes a constant pressure, with unremitting deep and throbbing pain. There is an extensive swelling of the face. When a tooth in the upper jaw is abscessed, the swelling extends over the upper part of the face, often partly closing the eye. When in the lower jaw, the swelling may extend down into the neck.

At the peak of the inflammation, there is usually a high fever, preceded by chills. Also, among the usual symptoms are flushing of the face, headache, constipation and highly colored urine. In extremely serious cases, delirium may occur, and in the event of extensive pus absorption, blood-poisoning (*septicemia*) may occur.

Shortly before the abscess breaks the swollen gum takes on a whitish appearance, which is known as the "pointing" of the abscess. With the breaking of the abscess and the discharge of most of the pus, there is a cessation of pain.

The disappearance of the pain and swelling does not imply that the trouble has been eliminated. It means that after a past accumulation of infection an upheaval has taken place, and conditions become temporarily quiet—very similar to the state of a volcano, in its periods of apparent latency—but as long as the seat of the disease remains, there is always the possibility of a recurrence of the acute abscess.

If relief from the more extreme symptoms is afforded by a discharge of pus through the sinus, this may prove detrimental to the general health. It is always a liability to carry around an infection of this kind, and the sooner the case is given thorough-going attention the better.

Never wait for an abscess to run its course, or quiet down on its own account, but at the first hint, seek relief from the dentist, and arrange for prompt removal of the cause of this disturbance. It may be necessary to have an X-Ray taken to obtain a satisfactory diagnosis.

Blind Abscesses.—The blind abscess—or *dental granuloma*—as it is technically known—is an insidious foe. It causes practically no local disturbances, and this absence of definite symptoms sometimes results in a more unfortunate series of troubles than the intense pain of the acute abscess. The latter gives a warning which is usually headed, while the blind abscess works its mischief painlessly and unobtrusively.

The presence of the blind abscess is often suspected by some constitutional ailment or certain physical or mental symptoms for which no organic basis seem to be in evidence. In any vague disorder of this kind, it is always advisable to have an X-Ray examination of the teeth.

The seat of the infection may be a tooth from which the pulp has been removed. Instead of dissolving a considerable amount of tissue into pus, however,—as in an acute abscess—a blind sac, or *granuloma*, is formed.

A certain amount of bone is eaten away, leaving the sac, and it is this defect in the bone

structure which shows as a dark area in the X-Ray picture.

The consequences of blind abscesses, in general disabilities and specific diseases, are many and far-reaching. Some of these results have been referred to in Chapter I, under the caption of Focal Infections.

It may impress one more with the seriousness of alveolar abscesses—both blind and acute—to state that they are in reality infections of the jaw-bone. If neglected, they may cause serious involvement of the bone structure of the jaw, as well as disease in any part of the body.

IMPACTED AND UNERUPTED TEETH

Civilization hits us pretty hard at times—with all its compensations—and the dental structure is undoubtedly the hardest hit of all. The biologists tell us that one of the penalties of evolutionary progress is a shortening of the jaws. Consequently, there is becoming less room for the teeth and some of them are extremely crowded and are getting smaller, particularly the third molars and lateral incisors.

Worse still, in many instances, certain teeth are sometimes missing altogether. That is, they are not visible. However, in these cases, they are usually lying more or less undeveloped, below the surface of the gums.

These are known as unerupted teeth. The reason they do not erupt is, as aforesaid, because there is not space enough in the jaw for them to take their place alongside their more fortunate fellow teeth. In this submerged state, they become locked or impacted—jammed or crammed down by the adjoining teeth. Often in the case of the third molar, or "wisdom" tooth, it is forced into a horizontal position, instead of the normal upright one,

which makes the situation more difficult. Sometimes the bicuspids become impacted.

Residing in this unnatural position in the jaw, impacted teeth are very susceptible to infection, and as their very presence in most instances is not suspected, the trouble caused by the infection remains more or less a mystery.

The presence and position of unerupted, impacted teeth can be determined by an X-Ray picture of the jaw. They cause distressing local symptoms (from pressure on a nerve), such as sharp, throbbing or dull pains, or, in other cases, a vague, obscure sensation of pressure. The trouble is relieved by removing the unwelcome, unaccommodated teeth.

Cancer of the Mouth.—Buccal cancer, or cancer of the mouth cavity, is a serious affliction that may result from any sort of chronic irritation or friction in that locality. While the most frequent cause is undoubtedly irritation from excessive smoking, dental causes are also a factor. Of the latter, a broken tooth, hook, diseased root or an ill-fitting plate, may be the seat of the irritation. If one is bothered by any of these irritating stimuli, no time should be lost in going to a dentist to have the offending object eliminated.

According to data obtained by the Metropolitan Life Insurance Company, as a result of a comprehensive survey of the mortality from cancer among its millions of policyholders covering the twelve-year period from 1911 to 1922 inclusive, cancer was the fifth cause of death in numerical importance. Buccal cancer was responsible for 8.9 per cent of all cancer among white males, and 6.9 per cent among colored males. Only one per cent of deaths from cancer among females was due to buccal cavity growths.

Chapter 5.

TEETH AND DIET

The question of diet is so frequently stressed that, superficially, it seems almost like carrying coals to Newcastle to be injecting the subject continually into a treatise dealing with the teeth.

There is no question, however, more important in its relation to the teeth than diet. It is this fact which makes it so necessary to emphasize the eternal food problem in this connection.

There are today perhaps millions of people who have been converted to the necessity of mouth hygiene, who clean their teeth daily, visit the dentist regularly, and otherwise observe a commendable degree of oral hygienic precautions, but who, nevertheless, have yet to learn of the equally fundamental requirement of safeguarding the teeth by dietetic measures.

In one sense at least diet is even more fundamental than mouth hygiene—if this may be said without implying that the latter is not absolutely essential. What we mean is that proper diet, in the first place—in the prenatal stage—builds good sound teeth that are an asset throughout infancy and childhood, and, with reasonable care, adulthood.

On the other hand, if the mother, for any reason, lives on a faulty diet during the period of pregnancy, the teeth of the baby are bound to be defective, particularly if the infant's diet is not what it ought to be during the time the

teeth are further developing in the gums, in the stage preceding eruption.

So if the teeth are not sound to begin with, because of improper diet, the most perfect mouth hygiene subsequently will not bring about good, sound teeth. Even then, of course, oral hygiene is most desirable, as it lengthens the period of usefulness of even inferior teeth, and postpones the day when they will have to be replaced by artificial ones.

Food is divided into the following classifications: Proteins, carbohydrates, fats, mineral salts and vitamines.

Proteins are nitrogen-containing elements, which make up the greater part of our bodies. This substance is necessary to build up and repair tissue, and to replace waste in the somatic cells. Much more protein is required by manual workers and persons doing hard physical labor than those following a sedentary life. Most adults would be healthier if they cut down on the proteins, and used more of the mineral salts and vitamine foods. Protein is obtained from both vegetable and animal food. (See table on subsequent page.)

Carbohydrate foods, the principal ones being sugar, starch and cellulose, generate heat and energy. Starch is a staple food. In the process of digestion it is transformed into sugar, in which form it is absorbed and utilized in the organism. Its chief sources are certain vegetables, but not in greens or the leaves of vegetables, nor in fruit or animal foods.

Sugar. The system normally obtains its greatest supply of sugar from starchy food, by the process above mentioned. There is an additional supply of natural sugar obtained from sweet fruits, in a form known as levulose and grapesugar. Commercial, refined sugar is

unnecessary for the well-being of the organism, because it is deprived of its mineral salts. It is therefore detrimental to health, and a proliific source of teeth infections. If sweetening is demanded, the natural sugar should he used —genuine brown sugar (which contains the mineral elements), molasses, maple-syrup and honey. And, of course, the sweet fruits are recommended.

Cellulose and vegetable fibres are not assimilated in the body. Strictly speaking, therefore, they are not food products, but are valuable constituents of the diet, because they help digestion in a mechanical way and give consistency to the bowel contents. They are the *roughage.* A sufficient quantity of this substance is the best natural preventive of constipation. Cellulose is contained only in vegetables, fruits and the husks of grains. It is absent from refined wheat flour.

Fats produce heat and energy, and in moderation have a particular value as a reserve food, for use by the body in case of deficiency. Thus, a person who is taken severely ill for an extended period, and unable to assimilate or digest sufficient food for the bodily requirements, lives in part on the reserve fat that is tucked away throughout the tissues of the body.

Mineral salts are vitally important, as much so as protein foods. While the necessity of the latter is appreciated by practically everyone, the importance of mineral salts have been overlooked by the great mass of people. All the tissues of the body require these elements, and particularly the bone and teeth, more especially during the period of development. A well balanced diet, therefore, should always contain a liberal quantity of food having potassium, calcium, sodium, iron, and chlorine.

They are contained in varying proportions in green and leafy vegetables, fruits, the outer coatings of grains, and vegetables, also in milk and eggs. Lean meats contain some of the mineral salts, but are deficient in others.

The *Vitamines*, of which there are now four identified, are like the mineral salts, vital to health. They are obtained chiefly in the following foods: Vitamine A in milk (unskimmed), butter, young sprouting vegetables, and most animal fats, except lard, the yolks of eggs, and cod-liver oil. Vitamine B in whole grain cereals and practically all vegetables. Vitamine C in fresh fruits and vegetables, also in milk from cows that are grazing in green pasture. Fresh tomatoes are rich in Vitamines A, B and C. Vitamine D is found in egg yolks and cod-liver oil.

The following table is appended for the guidance of readers who are desirous of studying the food problem with the intent of availing themselves of a properly balanced diet. It is a fact that people living in the country, especially those who have gardens and farms, could make their diet much more healthful and vitalizing without adding to the expense; in some cases at less expense. To a certain extent, this applies to city and town people too. It is less expensive, for instance, to buy brown sugar, than refined sugar; whole wheat and rye breads cost no more than white; molasses is more desirable and costs less than refined syrups. Honey can be obtained for about the same price as many highly sugared preserves and jams.

PRINCIPAL NUTRITIONAL ELEMENTS OF COMMON FOODS

Proteins	Fats	CARBOHYDRATES			Mineral Salts
		Starch	Cellulose	Sugar	
Meats	Meats	Corn flour	Whole Grains	Molasses	Green vegetables
Fowl	Lard	Rice	Wheat	Honey	Fruits
Fish	Marrow	Sago	Oats	Maple Syrup	Whole Grains (outer shells)
Eggs	Butter	Oats	Bran	Dates	Milk
Milk	Cream	Barley	Vegetables	Figs and all sweet fruits	Cheese
Cheese	Cheese	Wheat	Fruits (the fibre)		Butter
Peas	Eggs	Potatoes			Eggs
Beans	Olives	Peas			*Meat
Nuts	Nuts	Beans			Potatoes
Lentils	Cotton-seed oil				
Grains, (10%)					

*Some mineral salts only.

DIET FOR EXPECTANT MOTHERS

As the pregnant woman is destined, for a period of nine months, to supply nourishment for an embryonic being, as well as for herself, the question of diet is to her one of double importance. The well-being of the prospective infant is equally involved with that of her own welfare.

At this time, while a sufficient quantity of food is necessary, the quality and right selection are really of more importance. The appetite ordinarily governs the matter of quantity (barring poverty or other hardship), but the right selection requires a knowledge of dietetic facts which is often lamentably lacking where there is ample means to obtain the best.

When we take into consideration that the baby's first, or deciduous, teeth begin to form about the third month, we better realize how necessary it is that the mother receive the proper nutritional elements to take care of the new dental construction, as well as the building of the whole little, but complicated, body.

The materials needed for the developing embryo can come from only two sources: from the food which the mother eats, or from her own body tissues. If she does not eat the proper kind and amount of food, and assimilate it, then Nature draws upon the substance of her own body to nourish the baby. As we have already indicated, the embryo requires mineral salts and vitamines to grow good, sound teeth and strong bones, and if these elements are not contained in sufficient quantity in the mother's food, they are taken from her own teeth and bones. During the last four months of pregnancy, the mother requires about one-fifth more food than normally.

The daily menu of the expectant mother should include the following: Vegetables—two or more a day, including a leafy vegetable. Fruit—preferably fresh, twice or more times a day. Graham or whole wheat bread, with meals, and a coarse cereal. Meat, fish or poultry—not more than once a day. Milk or buttermilk—a quart daily, used in cooking or as a drink. Eggs (not fried), occasionally instead of meat. Not more than one cup of coffee daily. Tea also in moderation. Water, drunk liberally between meals—a great deal of water is required in the biological process of baby-building. No fried foods, rich pastries, highly seasoned foods or strong stimulants. A glass of milk may be taken between meals in mid-morning and mid-afternoon, and before going to bed. Some coarse cereal also may be taken before retiring if the appetite calls for it.

The selection of food should be varied from day to day to avoid monotony, and to assure a supply of all the substances needed for both mother and the developing baby.

As Drs. Ryan and Bowers state in their excellent manual, *Teeth and Health*: "But it would be much better if dentists everywhere would teach the people that the great cause of tooth destruction lies principally in lime and phosphorus starvation, brought about by eating—from the time the mother first conceives the child, until the individual dies of old age—a diet robbed of its minerals, totally deficient in the lime and phosphorus necessary, not only to make teeth and bones, but also to make nervous systems and brains, and to keep the numerous functions of nutrition—regulated by the activities of the ductless glands—from going awry, and making a mess of the whole organic structure—mental, physical and moral.

Chapter 6.

IMPORTANCE OF DENTAL ATTENTION

Periodical Examinations. Mouth hygiene is a regular daily routine, as much so as washing the face and hands, and faithful attention to this requirement is not only an index of personal cleanliness, but a means of prolonging the health and usefulness of the teeth, and contributing to the physical well-being generally.

This daily practice, however, should be supplemented by regular, periodical dental examinations, at least every six months with the average person. If the teeth are below par, and contain many fillings, or much other dental work, it may be advisable to have the teeth inspected oftener.

The advantages of keeping the teeth intact, or preventing further damage when inroads have already been made upon the dental economy, and the dangers involved in infected teeth and gums, have been so fully covered already that it is unnecessary to elaborate upon the subject here.

It is decidedly to every individual's advantage to adhere religiously to the policy of regular, periodical examinations. Do not for a moment deceive yourself into thinking that you are saving money by neglecting this requirement.

If the examination shows that no fillings or other operative treatment are needed, then you have the keen satisfaction of knowing that

your teeth are in good condition. If some slight specks or small cavities are detected, they can be filled without much trouble, pain or expense, and you have forestalled a bigger and more painful job, and perhaps saved the tooth many more years of service by timely attention.

In any event, the expense is always minimized by having the teeth examined regularly, and receiving prompt treatment when they show the first signs of decay, or when a piece of tooth breaks off, or any other dental problem presents itself.

To reiterate, save your health, your teeth, and your money by *periodical dental examinations.*

DENTAL CARE FOR EXPECTANT MOTHERS

The expectant mother, in particular, should be careful of her teeth from the very beginning of pregnancy. We have already emphasized the importance of diet, and made various recommendations in this respect.

However, tooth decay and acute abscesses are especially liable to occur at this time, if there is the least deficiency in the normal tooth structure or inadequacy in the diet.

Because of the demands upon the expectant mother's physical resources and vitality—a latent infection or other predisposition to dental trouble only too often results in quick decay, tooth-aches, abscesses and a general undermining of the health of the teeth.

Infected teeth should be extracted, cavities filled, and the mouth and gums kept in a healthy state.

X-RAY EXAMINATIONS

While we have spoken of the normal, clinical examinations of the teeth, it is always important to mention the possible desirability of X-ray examinations. Teeth should be X-rayed by a dentist, or sent to an X-ray laboratory only upon his advice. It is a mistake to go to commercial X-ray laboratories for diagnoses.

No matter how placid the gums and teeth may look, or how free from pain, there is no way of discovering the condition beneath the surface except by an X-ray picture. If the teeth contain any large fillings, pulpless teeth, crowns, bridgework, etc., even if there is no inflammation or unpleasant sensation, one should have the teeth X-rayed. This is especially true if there are any general physical disabilities which may come from a focal infection.

The X-ray picture will show a great amount of detail of the subsurface structure, and the condition of the various parts. It will show whether there is any infection at the root end of the tooth, and whether or not there are pus pockets at the side. It will also disclose whether a tooth has a root-canal filling, and whether or not this filling is perfect. Leaky fillings, overhanging gold crowns and other defects can likewise be detected.

The X-ray exposes faulty dental work, as well as pathological conditions of the mouth and jaw.

It is particularly important to have a thorough X-ray examination if one has any "dead" or pulpless teeth (from which the nerve has been removed). In the light of modern, anti-

septic dentistry, these members are suspicious characters, and should be closely watched, even if apparently giving no trouble. The disadvantages of pulpless teeth as a hidden menace to health may far outweigh their advantages for mastication.

Another advantage of the X-ray is that, if dental trouble cannot definitely be located, so that the source of the disturbance may be in either one of two or more teeth, it can be traced by this method. This enables the dentist to make an accurate diagnosis. Many mistakes in treatment can be avoided by the use of the X-ray at a great saving to the patient of both trouble and expense.

There is no question that many sound, or comparatively good teeth, have been pulled in the case of vague, indefinite tooth-aches, and swellings—often as the insistence of the patient himself—only to be found that the trouble remained undiminished.

Dr. Eugene Lyman Fisk, Director of Hygiene of the Life Extension Institute, New York, has given a striking example of the benefits to be derived from an X-ray examination, with proper treatment as shown to be required by the diagnosis, in the following paragraph:

"Perhaps the most essential feature of the periodic examination is the X-ray, without which the discovery of some sources of physical impairment would be impossible. An instance of its value is the story of a man who was suffering from rheumatism and cystitis. He had severe pain and had lost weight very much before coming to the Laboratory. During the examination it was discovered that, although most of his teeth were gone, he had still about half a dozen, all of which were loose, and he wore a plate. An X-ray of his

teeth showed that all of them were abscessed, which caused a continuous drainage of poison into the system. He was advised to have his teeth out. A few days afterwards he returned to the institute. His rheumatism and bladder trouble had practically disappeared and he no longer suffered pain. After six months, it had not returned. Infected teeth often cause rheumatism, as almost everyone knows, but the interesting feature of this case was that the bladder trouble apparently also came from the same source."

BRIDGEWORK AND CROWNS

There are two types of bridges—the *fixed* and the *removable*. The former is cemented to the teeth on either side of the space for which the missing teeth are supplied. It is undoubtedly the most efficacious form of dental structure, from the mechanical standpoint, as it simulates the more natural teeth more closely than any other form of artificial denture.

Often a single artificial tooth is bridged to an adjoining natural tooth. If a fixed bridge can be contrived, without imperiling the tooth or teeth to which the bridgework is anchored, it is an extremely serviceable arrangement. It may help to carry along a set of inferior teeth for some years, under strict dental supervision, until it finally becomes necessary, because of the deterioration of the teeth, to eliminate the bridgework in favor of a plate.

Objection is often made to fixed bridges on account of the unhygienic conditions which frequently exist under them. This, of course, may be due to careless or indifferent cleans-

ing on the part of the patient. Under modern antiseptic dentistry, fixed bridges are not looked upon with such universal favor as they were at a former period, although, as we have stated, there are cases when they may be recommended. When supplied, they must always be made so that no injury is done to the tissues, and with the least possible tooth destruction; nor must they interfere with the hygienic conditions of the mouth. Bridges with worn out crowns are a menace and endanger the vitality of the pulp. When the crowns become worn through they should be removed immediately, and a new bridge supplied.

Removable bridges are considerably more sanitary, inasmuch as they can be taken out and cleaned, and the anchoring teeth thoroughly brushed. There is always the possibility, however, of the attachments—no matter how carefully made—causing friction on the anchoring teeth, and this may result in erosion. Some owners of the removable bridges make it a habit of leaving the denture out of the mouth for considerable periods at a time, and as the natural teeth change their relation slightly if the bridge is not worn constantly, it is not long before the appliance does not fit well. It is also advisable to wear the bridge at night, after cleaning, to preserve the proper relationship of the teeth.

Gold crowns are not nearly so popular as they once were, and there is no assurance, even when most skilfully made and perfectly fitted, that the gums will not be irritated and pus pockets form. Many defective teeth that were formerly crowned are now reinforced by other more hygienic technique, if it is considered advisable to still retain the tooth. As

it is usually pulpless teeth that are crowned, it may seriously be questioned whether it is ever policy to resort to this unhygienic and generally unsatisfactory denture.

PROPHYLACTIC DENTISTRY. Preventive dentistry is now one of the greatest of modern agencies for improved individual and social health. Its influence is far-reaching and will continue to be greater as the advantages of sound teeth become more widely recognized.

The clinical and mechanical resources of dentistry are now developed to a remarkable degree of efficiency. This science reaches its highest state of perfection in the prophylactic realm. With even an elementary knowledge on the part of the great masses of people of the profound importance of oral hygiene, and constructive dietetics, there will be prevented an immeasurable amount of disease, ill health, pain and the inconveniences that are the inevitable accompaniments of unsound and imperfect teeth.

It is to hasten this thoroughly practical end, and help achieve this enviable goal, that the authors have written the present little book.